



August 8th, 2022

Dr. Cheryl Laskowski
Chief, Transportation Fuels Branch
California Air Resources Board
1001 I Street Sacramento, CA 95814

Re: Workshop to Discuss Potential Changes to the Low Carbon Fuel Standard held July 7th, 2022

Dear Chair Randolph,

A strong Low Carbon Fuel Standard market, driven by aggressive carbon reduction targets, is essential to developing the low carbon technologies that California will need in the future.

My company, Mote, is developing technologies to turn California's wood waste into carbon-negative hydrogen. Our concept is a direct spinout of the work that I did with my former colleagues at Lawrence Livermore National Laboratory on the report, *Getting to Neutral: Options for Negative Carbon Emissions in California*. In that report, we assessed methods of carbon removal to meet California's climate targets, as well as options to manage waste biomass, including forest residues from much-needed fire management. We found that gasifying biomass to make hydrogen, while capturing and storing CO₂ for geologic storage, was the best option for the bulk of California's carbon removal needs. Even better, it solves multiple problems at once, yielding clean fuel and improving local quality.

California will need dozens of biomass gasification facilities like Mote's to achieve the vision in *Getting Neutral*. The good news is that the Low Carbon Fuel Standard (LCFS), along with supporting incentives and legislation, is an effective mechanism to support these projects. However, new technologies, including ours and any carbon removal technologies that matter, are expensive and difficult to deploy. The near-term credit prices matter greatly to their success.

In the Lawrence Livermore analysis, biomass gasification to hydrogen can yield safe, durable carbon removal at extremely modest prices of \$40-60/ton-CO₂. But that is the "*n*th plant" cost by the year 2045. As I now know well from my work at Mote, the first-of-a-kind capital costs are about 4 times higher than those projections. Meanwhile, other risks and challenges of building industrial projects in California mean that effective incentives must be higher still. Otherwise, the early plants will not get built, and *n*th plant costs will never be achieved.

At historic average LCFS credit prices (about \$163/ton-CO₂), Mote is able to finance the carbon-negative hydrogen projects that benefit California and continue developing our technology for lower-cost projects in the future. At prices less than about \$100/ton, that is no longer true.



Other carbon removal technologies, like direct air capture, are even less viable in such a market. Consequently, these longer-term innovations would stagnate. Thus, we recommend the lowest reasonable Carbon Intensity target for 2030 ("Option B") to support the state's longer-term (e.g. 2045) emissions goals. Supporting higher prices now to drive down technology costs will have outsized benefits in the future when carbon removal is deployed at much larger scale.

The current LCFS framework has spawned many innovations in carbon reduction. The target Carbon Intensity should be tightened continue those benefits. Thank you for your consideration.

Sincerely,

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